

## Chapter 2:

# Lake Michigan Lakewide Management Plan: Vision, Goals, and Ecosystem Objectives

Chapter 2 of the Lake Michigan Lakewide Management Plan defines the vision, goals, and ecosystem objectives of the Lake Michigan LaMP. The ecosystem goals were adopted in August 1998, expanding the focus of the LaMP from chemical stressors and beneficial use impairments to include physical and biological stressors and human health issues. The vision, goals, and subgoals are based on three principles: (1) remediation, (2) integrity and sustainability, and (3) partnership frameworks. LaMP goals must be linked to beneficial use impairments, development of indicators, monitoring and reporting on indicators, effective implementation strategies, and stakeholders. Subgoals describe either endpoints or means to achieving those endpoints. While all 14 beneficial uses are impaired in at least one location in the basin, the impairment is not necessarily uniform across the basin. Therefore, beneficial use impairments are classified spatially as follows: (1) local, (2) regional, or (3) open lake or lakewide. In addition, the LaMP will promote stewardship and preservation activities in areas where no use impairments exist. The Technical Coordinating Committee and Lake Michigan Forum have developed draft ecosystem indicators to identify simple values that reflect the condition of an ecosystem component. The LaMP committees, regional federal agencies, and the Great Lakes Commission have established the Lake Michigan Monitoring Coordinating Council (LMMCC) to coordinate and support monitoring activities in the Lake Michigan basin, as well as to disseminate the information available. Implementation strategies will require cross-jurisdictional and cross-program coordination. However, many of the tools necessary to restore and maintain the Lake Michigan ecosystem already exist, and careful coordination among the diverse stakeholders can integrate diverse resources and regulatory authorities to ensure the attainment of the Lake Michigan LaMP vision, goals, and ecosystem objectives.

## CONTENTS

<u>Section</u>	<u>Page</u>
2.1 About This Chapter . . . . .	2-1
2.2 The Goal Development Process . . . . .	2-1
2.3 The Goal Structure of the Lake Michigan LaMP . . . . .	2-3
2.4 Linking LaMP Goals to Beneficial Use Impairments . . . . .	2-3
2.5 Linking LaMP Goals to Indicator Development . . . . .	2-5
2.6 Linking LaMP Goals to Monitoring and Reporting . . . . .	2-6
2.7 Linking LaMP Goals to Effective Implementation . . . . .	2-7
2.8 Linking LaMP Goals to Other Initiatives and Efforts . . . . .	2-7
2.9 Linking LaMP Goals to Partners and Stakeholders: Examples . . . . .	2-9
GLOSSARY . . . . .	2-13

## Tables

<u>Tables</u>	<u>Page</u>
2-1. End Point Subgoals . . . . .	2-4
2-2. Means to End-Point Subgoals . . . . .	2-4
2-3. Lake Michigan LaMP - Goals and Beneficial Use Impairments (BUI) Cross Walk . . . . .	2-5
2-4. Lake Michigan LaMP Summary Table (Chapter 2) . . . . .	2-14

## Chapter 2: Lake Michigan Lakewide Management Plan: Vision, Goals, and Ecosystem Objectives

---

### 2.1 About This Chapter

The purpose of this chapter is to present and discuss the vision and goals for the Lake Michigan LaMP process. The chapter introduces and defines a suite of **ecosystem** management **goals** developed in accordance with the purpose of the Great Lakes Water Quality Agreement. The chapter also describes the role that various statutes and ordinances, agencies, partner organizations, stakeholder communities, and the general public play in the achievement of the LaMP goals. These goals provide a blueprint for the implementation of the LaMP, and they provide a set of “finish lines” against which progress in achieving lakewide management can be monitored and measured.

#### ECOSYSTEM GOALS

Ecosystem goals are holistic and integrative. They are designed to achieve a balance between the environmental, economic, and social elements upon which the ecosystem approach is based. For the purposes of the Lake Michigan LaMP, ecosystem goals have been organized into two classes: those that specify endpoints and those that specify the appropriate means to those ends.

The suite of goals presented in this chapter provides the context for the integration of the programs and projects that make up ecosystem management on a basin-wide scale. Because agency policies, missions, and program objectives are necessarily specific and sometimes narrowly focused, any single ecosystem goal may address multiple media and disciplines. In addition, care has been taken to develop a suite of goals that integrate remediation in the context of the restoration and protection required for long-term sustainability in the basin ecosystem. Finally, the goals provide a basis for specifying the levels of ecosystem integrity required to restore beneficial uses and provide for healthy human and natural communities in the Lake Michigan basin, as well as the basis for LaMP objectives and LaMP indicators, elements necessary for the measurement of progress toward the LaMP vision. A glossary of terms defined by the organizations working with these concepts is provided at the end of this chapter.

### 2.2 The Goal Development Process

In 1998, the Lake Michigan Technical Coordinating Committee (TCC) and the Lake Michigan Forum worked with the Green Mountain Institute for Environmental Democracy to develop goals and objectives for the LaMP using comparative risk methods. The goals build on and amplify the purpose of the GLWQA, which was amended in 1987 to endorse a coordinated, cooperative effort to protect and restore the Great Lakes ecosystem. In 1997, the Lake Michigan Management Committee approved an ecosystem scope for the Stage 1 Lake Michigan LaMP, and in August 1998, the Management Committee adopted the ecosystem goals presented below.

These decisions and actions result in not only continued work on chemical stressors, a focus of the previous two LaMP drafts, but also a definition and framework for the LaMP ecosystem scope. This expanded scope encourages work on physical and biological stressors, human health, the continuation of activities to address beneficial use impairments, and the development of a set of LaMP objectives. The

challenge of the LaMP is to coordinate the ecosystem goals and objectives with the GLWQA's beneficial use impairments and numerous other federal, state, tribal, and local goals to produce a clear, strategic action agenda.

### **THE GREAT LAKES WATER QUALITY AGREEMENT**

The Purpose of the Parties is to restore and maintain the chemical, physical, and biological integrity of the Great Lakes Basin ecosystem.

### **LAKE MICHIGAN LaMP VISION AND GOALS**

Adopted by the Management Committee August 18, 1998

#### **LAKE MICHIGAN LaMP VISION – DESIRED OUTCOME**

A sustainable Lake Michigan ecosystem that ensures environmental integrity and that supports and is supported by economically viable, healthy human communities.

#### **LAKE MICHIGAN LaMP GOAL<sup>1</sup>**

To restore and protect the integrity of the Lake Michigan ecosystem through collaborative, place-based partnerships.

The vision, goal, and subgoals presented and discussed are based on three overarching principles: remediation, integrity and sustainability, and partnership frameworks.

**REMEDIATION.** Reduce loadings and emissions of LaMP critical pollutants to the Lake Michigan ecosystem and remediate contaminated sediments within the 10 Areas of Concern in the Lake Michigan basin; utilize the LaMP process to develop reduction targets (building on the Lake Michigan Mass Balance Study and the Binational Strategy); and achieve substantial reductions in human and ecological health risks in the basin.

**INTEGRITY AND SUSTAINABILITY.** Restore and protect key components of the Lake Michigan basin ecosystem so as to ensure levels of integrity that will provide ecosystem benefits and services to the natural and human communities in the system on a long-term basis; and have in place the means to maintain a long-term balance between environmental integrity, economic vitality and sociocultural well-being – all of which are measures of sustainability.

**PARTNERSHIP FRAMEWORKS.** Develop partnership frameworks and infrastructures that involve as many types of government, organizations, tribes, industries, and residents in the actual work of ecosystem protection and remediation at levels appropriate to their roles.

These principles form the basis of the LaMP Vision and Goals, and provide a framework for the development of the LaMP subgoals.

- 1 The Great Lakes Fishery Commission (GLFC) has adopted the Great Lakes Water Quality Agreement Goal, Joint Strategic Plan for Management of the Great Lakes Fishery, and Fish Community Objectives for Lake Michigan. The more specific goal statements for Lake Michigan are: To secure fish communities, based on foundations of stable, self-sustaining stocks, supplemented by judicious plantings of hatchery-reared fish, and provide from these communities an optimum contribution of fish, fishing opportunities and associated benefits to meet needs identified by society for: wholesome food, recreation, employment and income, and a healthy human environment. In addition, the Commission has adopted fish-community objectives for Lake Michigan for each relevant sub-goal.

## 2.3 The Goal Structure of the Lake Michigan LaMP

The tables on the following pages, Table 2-1 and 2-2, present the subgoal organization of the Lake Michigan LaMP. There are two types of subgoals of the LaMP: those that describe end points and those that describe means. Both types of subgoals are required to achieve the goal of a sustainable Lake Michigan basin ecosystem. Icons are introduced to represent each of the subgoals to help guide the reader throughout the LaMP.

## 2.4 Linking LaMP Goals to Beneficial Use Impairments







The suite of subgoals for the Lake Michigan LaMP was designed to include and integrate remediation efforts aimed at beneficial use impairments – one of the three overarching principles that guided LaMP goal development. The matrix that follows (see Table 2-3) is a “cross-walk” that links LaMP subgoals and beneficial use impairments.

For Lake Michigan LaMP designation purposes, beneficial use impairments have been spatially classified as:






- **Local** – An AOC or other area affecting the lake
- **Regional** – An AOC cluster or multi-jurisdiction watershed
- **Open water or Lakewide** – The condition of pervasive impairment

Because all 14 beneficial use impairments have been observed in the Indiana Harbor and Ship Canal AOC, the LaMP has been prepared with the understanding that all 14 need to be addressed in the basin; however, this does not imply that impairment is uniform across the ecosystem or that sufficient data exist to quantify conditions to any fine level of detail at this time. Recognizing the limitations of focusing solely on locations where beneficial uses have been impaired, the Management Committee approved the application of the LaMP process to a broad range of places using the LaMP vision, goal, and subgoals to guide such decisions. The impact of this guidance by the Management Committee has allowed LaMP activities to focus not only on the AOC but also in places like the Chicago metropolitan area and the St. Joseph River watershed because of their impact on the ecosystem. Similarly, in keeping the LaMP Vision, other places not afflicted with beneficial use impairments have been the focus of activities to promote stewardship and preserve environmental integrity.







**Table 2-1. End Point Subgoals**

<i>End Point Subgoals</i> Endpoint subgoals describe the desired levels of ecosystem integrity and ecological services required to restore beneficial uses and provide for healthy human and natural communities in the basin.		
Subgoal 1	We can all eat any fish.	
Subgoal 2	We can all drink the water.	
Subgoal 3	We can all swim in the water.	
Subgoal 4	All habitats are healthy, naturally diverse, and sufficient to sustain viable biological communities.	
Subgoal 5	Public access to open space, shoreline, and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake	
Subgoal 6	Land use, recreation, and economic activities are sustainable and support a healthy ecosystem.	

**Table 2-2. Means to End-Point Subgoals**

<i>Means to End-Point Subgoals</i> Means subgoals describe the natural and organizational processes required to achieve the endpoint subgoals.		
Subgoal 7	Sediments, air, land, and water are not sources or pathways of contamination that affect the integrity of the ecosystem.	
Subgoal 8	Exotic species are controlled and managed.	
Subgoal 9	Ecosystem stewardship activities are common and undertaken by public and private organizations in communities around the basin.	
Subgoal 10	Collaborative ecosystem management is the basis for decision-making in the Lake Michigan basin.	
Subgoal 11	We have enough information/data/understanding/indicators to inform the decision-making process.	

**Table 2-3. Lake Michigan LaMP - Goals and Beneficial Use Impairments (BUI) Cross Walk**

Goal		Beneficial Use Impairments
We can all eat any fish		<ul style="list-style-type: none"> <li>• Restriction on fish and wildlife (F/W) consumption</li> <li>• Tainting of F/W flavor</li> </ul>
We can all drink the water		<ul style="list-style-type: none"> <li>• Restrictions on drinking water consumption or taste and odor problems</li> </ul>
We can all swim in the water		<ul style="list-style-type: none"> <li>• Beach closings</li> </ul>
All habitats are healthy, naturally diverse and sufficient to sustain viable biological communities		<ul style="list-style-type: none"> <li>• Degradation of F/W populations</li> <li>• Fish tumors, or other deformities</li> <li>• Degradation of benthos</li> <li>• Eutrophication or undesirable algae</li> <li>• Degradation of phytoplankton and zooplankton</li> <li>• Loss of F/W habitat</li> <li>• Bird or animal deformities and reproduction problems</li> </ul>
Public access to open space, shoreline and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake Michigan ecosystem		<ul style="list-style-type: none"> <li>• Degradation of aesthetics</li> </ul>
Land use, recreation and economic activities are sustainable and support a healthy ecosystem		<ul style="list-style-type: none"> <li>• Restrictions on dredging</li> <li>• Added cost to agriculture or industry</li> </ul>

## 2.5 Linking LaMP Goals to Indicator Development

To determine whether conditions are getting better or worse over time, it is necessary to identify things that people can measure and accept as gauges regarding the condition of the system. Indicators, when tracked over time, provide information on trends in the important characteristics of a system. Ecosystem indicators are surrogates – simple values that reflect the condition of an ecosystem component.

The development of indicators is a partnership effort between the TCC and Lake Michigan Forum. The LaMP recognizes that indicators are under development in the State of the Great Lakes Ecosystem Conference (SOLEC) “Indicators for Great Lakes Basin Ecosystem Health” initiative. The Great Lakes Fishery Commission, represented on the TCC and Management Committee, has also been a lead contributor to the aquatic indicators for the LaMP. LaMP indicators under development are keyed to the condition of the endpoint subgoals (No. 1 through 6). LaMP indicators attempt to focus on ecosystem outcomes and progress made in the remediation of associated beneficial use impairments. Indicators describing the means subgoals (No. 7 through 11) are under development. Standards set for measuring the performance of federal agencies in the 1993 Government Performance and Results Act (GPRA) as well as state, tribal, and local data sources have informed the definition of LaMP indicators. The

emphasis of the LaMP ecosystem indicators are the status or condition of the ecosystem and the degree of beneficial use impairment.

The set of indicators presented in Chapter 3 provides an opportunity for public comment. The final decisions on indicators will consider these comments, institutional abilities to monitor and report on the indicators, and the ability of the indicators to measure progress toward achieving LaMP goals.

## **2.6 Linking LaMP Goals to Monitoring and Reporting**

Ecosystem indicators are directly tied to the LaMP goals and subgoals and are general in nature. These indicators should provide feedback to resource managers by describing the status of ecosystems and, therefore, the effectiveness of the programs. Program and project goals should support LaMP subgoals and link to one or more indicators. Thus, the development of indicators leads naturally to the design of a monitoring strategy to provide that feedback.

A critical component in the achievement of the goals of the LaMP and the Remedial Action Plans for AOCs in the basin is a monitoring regime that is sufficiently comprehensive to support the ecosystem indicators and is coordinated from one jurisdiction to another. While the Lake Michigan Mass Balance Project will provide important data on several critical pollutants affecting the lake, the need remains to assess the status and scope of monitoring being conducted by federal, state, tribal, and local agencies; to develop a plan for the coordination and enhancement of these efforts; and to develop a network to broadly share the results.

### **Enhanced Tributary Monitoring Project**

From 1998 to 2000, the Great Lakes Commission is aiding the LaMP efforts to assess monitoring activities in the basin as a preliminary step in the development of an infrastructure for monitoring and reporting. The Lake Michigan Tributary Monitoring Project convened representatives from each of the 10 Areas of Concern in addition to representatives from Door County, Wisconsin; and St. Joseph River, Grand River, and Grand Traverse Bay, Michigan. The assessment included discussions among the regional planning commissions, councils of government, and other such local agencies in the basin as well as municipalities. The assessment will focus on the enumeration and description of monitoring programs for Lake Michigan tributaries; the identification of data gaps; and the training of volunteer monitors at the local and Area of Concern level. Monitoring will be viewed in the broadest sense, including not only traditional water quality parameters, but also habitat, wildlife, land use, nonpoint source pollution, and other measures of ecosystem health. The Project held its final meeting in April 2000 and the consensus was to recommend establishment of a Lake Michigan Volunteer Monitoring Network.

### **Lake Michigan Monitoring Coordinating Council**

The Lake Michigan LaMP Committees, in partnership with regional federal agencies and the Great Lakes Commission, jointly established the Lake Michigan Monitoring Coordinating Council (LMMCC), a basin-wide collaborative body whose mission is “to provide a forum for coordinating and supporting monitoring activities in the Lake Michigan basin and to develop and make broadly available a shared resource of information, based on documented standards and protocols, that is usable across agency and jurisdictional boundaries.” The Objectives of the LMMCC are as follows:

- Document monitoring activities, identify data gaps, and contribute to the development of a monitoring framework for the Lake Michigan basin

- Establish and maintain collaborative partnerships that link federal, state, tribal, and local and non-government monitoring organizations and initiatives in the Lake Michigan basin to allow for the assessment of the quality of resources in the basin
- Foster the implementation of monitoring activities that document data quality and are comparable throughout the basin
- Maintain information networks that link basinwide information systems and allow for efficient sharing and updating of monitoring information

## 2.7 Linking LaMP Goals to Effective Implementation

The development of the LaMP holds great promise for achieving environmental improvement in the Lake Michigan basin, but it also offers significant challenges in terms of practicing environmental restoration and protection on this scale. One of the most significant of these challenges is the need for cross-program and cross-jurisdictional coordination. This includes coordination between the US and Canada, between federal agencies, and among states, provinces, and tribes, as well as coordination across a variety of statutory authorities. Because of this, EPA has taken the approach of using existing tools, as well as developing new and innovative ones, in concert with federal, tribal, state, and local partners to achieve environmental results that are relevant to a given place. To simplify the myriad of statutes, regulations and resources affecting the management of Lake Michigan, Appendix D presents a matrix of the major governmental units, regulatory agencies, and other significant stakeholders that are responsible for managing the Lake Michigan ecosystem. The matrix includes a description of these units, their goals, and their roles and responsibilities as they pertain to the restoration and maintenance of the chemical, physical, and biological integrity of the Lake Michigan ecosystem.

## 2.8 Linking LaMP Goals to Other Initiatives and Efforts

### Remedial Action Plans (RAP)

The GLWQA amendments of 1987 also called for the development of RAPs for specific Area of Concern. The two Federal governments were directed to cooperate with the state and provincial governments to develop and implement RAPs. The RAPs and LaMPs are similar in that they both use an ecosystem approach to assessing and remediating environmental degradation, focus on the 14 beneficial use impairments outlined in GLWQA, Annex 2, and rely on a structured public involvement process. RAPs, however, encompass a much smaller geographic area, concentrating on an embayment, a single watershed, or stretch of a river. The RAP focus is on local areas and use impairments for the local areas and the lake as a whole.

Forging a strong relationship between the LaMPs and RAPs is important to the success of both efforts. The RAPs serve as point sources discharges to the lake as a whole. Improvements in the AOC areas will eventually help improve the entire lake. Much of the expertise about use impairments, possible remedial efforts and watershed planning reside at the local level. Cooperation between the two efforts is essential in order for LaMPs to remove lakewide impairments.



## **Great Lakes Fishery Commission (GLFC) and Joint Strategic Plan for Management of the Great Lakes Fisheries**

Imbedded in LaMP 2000 are the GLFC goals and fish community objectives for Lake Michigan. The GLFC's Joint Strategic Plan for Management of the Great Lakes Fisheries (June 1997) [[www.glfc.org](http://www.glfc.org)] responded to the need to better coordinate and integrate fisheries and environmental ecosystem management initiatives, particularly regarding implementation of the Great Lakes Water Quality Agreement. The parties have attempted to meet this challenge by incorporating strengthened fisheries management and environmental management coordination into strategic procedures and the plan. The 1997 revision created the Council of Great Lakes Fishery Agency and included representation from signatories plus EPA and Environment Canada.

Fishery management authority in the Great Lakes belongs to the individual states and the province of Ontario, subject to tribal treaty areas. Although federal agencies are actively involved in Great Lakes fishery assessments, the states maintain primacy in fisheries management. In the late 1970s, it was required that the successful restoration and management of the Great Lakes fisheries required a more holistic approach to addressing fisheries related issues. A Joint Strategic Plan for Management of the Great Lakes Fisheries (Joint Strategic Plan) was established and coordinated activities designed to achieve a common set of fish community objectives. By utilizing a non-binding, consensus approach toward achieving the fish community objectives, the legal responsibilities of the individual natural resource agencies were not usurped or weakened while accomplishing a uniformed lakewide approach to addressing fishery issues. This has proven to be an effective management approach since the Joint Strategic Plan was first ratified in 1980. A revised version of the Joint Strategic Plan maintained the four basic strategies as well as the management structure of the 1980 version when it was ratified in 1997.

The Fish Community Objectives for Lake Michigan were published in 1995 (GLFC Special Publication 95-3) and have the goal to "Restore and maintain the biological integrity of the fish community so that production of desirable fish is sustainable and ecologically efficient." This fish-community goal is an extension of the ecosystem goals established by the GLWQA and the Joint Strategic Plan.

## **Great Lakes Binational Toxics Strategy**

Signed between the U.S. and Canada in 1997, the Binational Toxics Strategy (BTS) helps provide an overall coordinating effort across the lakes to reduce and virtually eliminate persistent toxic substances in the Great Lakes Basin. The Binational Toxics Strategy is a framework for actions to reduce or eliminate persistent toxic substances and establishes reduction challenges in the time frame 1997 to 2006 for twelve persistent toxic substances including PCBs and mercury.

The effort is important to the toxic reduction efforts of the LaMP for several reasons. It can work in the national and international arena to address out-of-basin air deposition sources, an increasingly important source of inputs to the lake. Second, because the BTS is closely coordinated with the U.S. Persistent, Bioaccumulative and Toxic Pollutant Strategy (PBT), it can disseminate the most current national and international scientific information. Lastly, the ambitious reduction time frames and schedules for virtual elimination of critical pollutants at the basin, national, and international level can help support basin level reduction efforts.

## **Great Lakes Five-Year Strategy**

The USEPA, Great Lakes National Program Office, in cooperation with their State, Federal, and Tribal partners, is developing "Great Lakes 2000: A Strategic Plan for the Great Lakes Ecosystem." This plan will serve as an overall strategy for committing to and achieving specific environmental goals into the

new millennium. The plan will focus on current cross media issues which include persistent toxic substances, habitat destruction, human, aquatic, and wildlife health, invasive species, and emerging issues facing the Great Lakes in the immediate future.

## **2.9 Linking LaMP Goals to Partners and Stakeholders: Examples**

LaMP partners include federal agencies, state agencies, tribes, industry, and non-governmental organizations. The goals of the individual partners were considered when developing the overall LaMP goals. The following goals of state, tribal, and industry partners are examples of individual partner goals that influenced the LaMP goals.

### **States**

The four Lake Michigan states have mature environmental programs that have been delegated the authority by EPA to issue permits, take enforcement actions, and clean up sites. Each state also has specific legislation that addresses state-specific problems. This jurisdictional difference and diversity of tools among the state partners can provide examples and new procedures if a collaborative dialogue exists.

### **Tribes**

The ecosystem approach has particular significance to the 10 Lake Michigan tribes that continue to live in traditional ways that are dependent on healthy, sustainable resources in the Lake Michigan basin. These tribal communities are located on lands that have been reserved for their use. Tribes do not have the ability to relocate these reservation areas in response to contamination or pollution. For traditional tribal communities, environmental protection and restoration in the Lake Michigan basin is also critical for spiritual purposes. There are certain places, both on and off reservation/tribal lands, that are considered to be sacred, and their preservation is a priority. Ceremonial practices can require fresh water, specific native plants, and access to natural settings. In addition, tribal members continue to collect native medicinal plants that are used in traditional healing practices.

Foods that are significant to the Native American diet are harvested from the land and waters of the basin. For many tribes, the fishery resources both in Lake Michigan and its tributaries are of critical importance. Studies have concluded that tribal members consume much higher amounts of fish than other populations in the basin, and thus are at a higher risk for adverse health effects associated with consuming contaminated fish. Many tribes also depend upon wild rice as a primary food stock. Wild rice is very sensitive to water quality and water levels, and protection of its habitat is crucial.

Many tribal members continue to make their livelihood or supplement their income through the harvesting of natural resources within the Lake Michigan basin. A few tribal commercial fishers still operate on the lake and one of the oldest sustainable forestry management programs is in the basin. Products such as maple sugar, basketry materials, fir boughs and fur bearing animals are also harvested in the basin.

As sovereign nations, tribes have developed and continue to administer environmental protection programs for their reservations/tribal lands that address water resource protection, solid waste management, emergency response, ambient air quality, and land use planning for the lands within their jurisdiction. Land areas outside of the reservation/tribal lands are also important to the tribes, as many retain hunting, fishing, and gathering rights in ceded territories. Tribes plan, monitor, permit and enforce environmental activities and in certain programs have the ability to act under the appropriate federal

statute. Tribal representatives participated in the development of the Lake Michigan ecosystem goals, and they reinforce the tribal goals described above and articulated as sustaining the environment:

“...unto the Seventh Generation. The Creator will guide our thoughts and strengthen us as we work together to be faithful to our sacred trust and restore harmony among ourselves and our relationships with others, with all living creatures and Mother Earth.”

## Industry

The Great Lakes Pollution Prevention Roundtable, the various trade associations supporting EPA's Strategic Goals Program and the Chemical Manufacturers' Association, with its Responsible Care™ Program, are examples of industrial organizations promoting pollution prevention. These pollution prevention goals align with several LaMP goals.

International standards for environmental management are emerging, and are expected to accelerate the trend toward quality-based environmental management in industry, focusing on customers, shareholders and stakeholders and relating performance to the expectations of multiple segments of society. The International Organization for Standardization (ISO) 14000 is a set of voluntary international standards for environmental management in industry, which may be adopted should a company or facility wish to receive ISO 14000 certification. The ISO standard requires that an organization's policies include commitments to: (1) comply with relevant laws, regulations, and other voluntary efforts; (2) recognize community comment and input; and (3) prevent pollution and work to continually improve its management system.

The ultimate test of this system of management is the ability to help a company be more efficient and competitive while reducing its impact on the environment.

Appendix D outlines the different units of government, regulatory, local, and tribal agencies and other groups, such as citizen groups and industry, that have an important role to play in restoring and maintaining the Lake Michigan ecosystem. Each of the governmental units, regulatory agencies, and other significant stakeholders listed in Tables D-1 through D-5 in Appendix D have been given some legal authority that enables it to regulate, study, or otherwise affect Lake Michigan. The U.S. Congress, state legislatures, tribes, and local officials grant these agencies the authority to carry out various tasks, including issuing permits to discharge waste, funding studies to measure the levels of various pollutants, regulating the application of fertilizers and pesticides, and issuing buildings permits, to name a few. These diverse resources and regulatory authorities can work in concert or in conflict. Awareness and coordination among the agencies, therefore, is an important factor in the ecosystem approach to managing Lake Michigan. Many of the tools to restore and maintain the Lake Michigan ecosystem already exist, in the form of agencies with legal authority and resources to dedicate towards the ecosystem approach. As the Interagency Ecosystem Management Task Force reported in *The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies*, Volume 11, *Implementation Issues*, November, 1995, page 69:

The federal government currently has significant statutory authority available to take an ecosystem approach to federal activities and to pursue collaborative efforts with state, tribal, and local governments and private parties. No single federal statute contains an explicit, overarching national mandate to take an ecosystem approach to management, and Congress has never declared that a particular federal agency has the ecosystem approach as its sole, or even primary, mission. Each agency operates pursuant to specific mandates that govern the particular lands that the agency manages, the environmental media (such as air and water) that it regulates, or the development projects that it builds or finances. However, many federal statutes provide agencies with opportunities to take an ecosystem approach, and a surprising number have been drafted with whole ecosystems in mind.

### **Steel Mills Report on Mercury Use**

Three major steel mills in Northwest Indiana (Bethlehem, Ispat Inland, and U.S. Steel) signed an agreement in September 1998 to reduce their use of mercury through pollution prevention and recycling activities. In September 1999, the mills released a report, "Mercury Sources of Three Indiana Steel Mills" and presented it at the IJC Biennial Forum in Milwaukee.

The agreement calls for the three participating companies to:

- Conduct an inventory of purchases of mercury and mercury-containing equipment and materials; mercury in use at the facilities in equipment and liquid mercury in storage; and the presence of mercury in waste streams and non-product outputs
- Identify, where possible, alternatives to mercury containing equipment and materials, and potential recycling options
- Prepare reduction plans that indicate reduction goals, planned actions to reach the goals, and schedules.

They concluded in this report that finding and addressing a pervasive substance such as mercury is a substantiated task and that more industries and facilities need to participate in similar efforts. Conclusions drawn from this mercury inventory by the steel mills that may be useful to other facilities include:

- Most of the mercury that exists at steel mills is contained in electrical and other equipment, making it most effective to target these sources for reductions. Manufacturers and suppliers should provide mercury content information for products that are intentionally manufactured with mercury. Mercury content labels would increase the effectiveness of equipment replacement and substitution.
- A central repository should be established to facilitate technology transfer as more inventories are conducted - for mercury as well as other contaminants of concern.
- Mercury switches should be routinely removed from 1995 and older model year cars before they are scrapped in order to reduce potential for mercury to enter the steel making process from scrap.

The next phase of the project will result in a reduction plan identifying steps to be taken by each facility to address the sources of mercury outlined in the report. Efforts will focus on purchasing equipment that does not contain mercury and putting effective disposal and recycling programs in place for equipment and laboratory wastes.

Source: [www.lkmichiganforum.org/mercury](http://www.lkmichiganforum.org/mercury)

While many laws are not written with the ecosystem approach in mind, the day-to-day business of the various agencies charged with carrying out these laws often profoundly affects Lake Michigan. For this reason, it is important that these various agencies, even those that do not have a mandate to protect the environment or manage natural resources, coordinate their efforts and resources while developing new and better ways of fulfilling their mandates. As stated in *The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies*, Volume 11, *Implementation Issues*, November, 1995, page 71:

The ecosystem approach requires agencies to do several things: to coordinate planning and management where appropriate, even where agencies operate under different mandates, to plan and manage on an ecosystem scale – that is, with ecological, not just administrative, boundaries in mind; to protect the rights of private landowners; to ensure early and active stakeholder participation; and to use adaptive management - to adjust their activities as applicable scientific principles evolve and as new information becomes available.

## GLOSSARY

Key terms used in the goals and subgoals as defined by organizations working with these concepts:

**Ecosystem:** An interactive system of biological communities; their nonliving components (air, land, and water); and their associated activities. As used by the International Joint Commission (IJC), ecosystems include humans, their activities and institutions.

**Biological Integrity:** The ability of an ecosystem to support and maintain a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to the best natural habitats within a region. (Karr and Dudley 1981). The term originated in the 1972 Water Pollution Control Act Amendments (PL 92-500) and has appeared in subsequent versions (PL 95-217; PL 100-1).

**Ecosystem Integrity:** A measure of the capacity of ecosystems to renew themselves and continually supply resources and essential services. Ecosystem integrity is the degree to which all ecosystem elements – species, habitats, and natural processes – are intact and functioning in ways that ensure sustainability and long-term adaptation to changing environmental conditions and human uses (Minnesota Department of Natural Resources, July 1997).

**Ecosystem Management:** The process of sustaining ecosystem integrity through partnerships and interdisciplinary teamwork. Ecosystem-based management focuses on three interacting dimensions: the economy, the social community, and the environment. Ecosystem-based management seeks to sustain ecological health while meeting economic needs and human uses (Minnesota Department of Natural Resources, July 1997).

**Collaborative Approaches:** Voluntary, multi-stakeholder, collaborative approaches to protect, restore, and monitor natural resources and to resolve natural resources conflicts (The President's Council on Sustainable Development [PCSD]).

**Sustainable Development:** Development that meets the needs of the present without comprising the ability of future generations to meet their own

needs (The World Commission on Environment and Development [The Brundtland Commission] 1987).

**Approaches to Sustainability:** Sustainability addresses three related elements: the environment, the economy, and the community. The goal is to maintain all three elements in a healthy state indefinitely (Minnesota Department of Natural Resources, July 1997). The air, land, and water are interconnected in sustaining all life, in protecting public health and in achieving healthy diverse ecosystems and the sustainable economies that depend on these ecosystems (Wisconsin Department of Natural Resources, 1999).






















**Biodiversity:** The variety of life and its processes, including the variety of living organisms, the genetic differences among them, the communities and ecosystems in which they occur, and the ecological and evolutionary process that keep them functioning, yet ever changing and adapting (Noss and Copperrider 1994).







**Exotic Species:** Species that are not native to an ecosystem and are usually introduced by purposeful or inadvertent human action (IJC).

**Integrity of the Great Lakes Basin:** The planning and management of the water resources of the Great Lakes Basin should recognize and be founded on the integrity of the natural resources and ecosystem of the Great Lakes Basin. The water resources of the basin transcend political boundaries and should be recognized and treated as a single hydrologic system. In managing Great Lakes Basin waters, the natural resources and ecosystem of the Basin should be considered as a unified whole (The Great Lakes Commission).

**Environmental Integrity Goal:** Enhance, restore, and sustain the health, productivity, and biodiversity of terrestrial and aquatic ecosystems through cooperative efforts to use the best ecological, social, and economic information to manage natural resources (PCSD).

Table 2-4. Lake Michigan LaMP Summary Table (Chapter 2)

CHAPTER 2		CHAPTER 6		
Lake Michigan LaMP: Vision, Goals, and Ecosystem Objectives		Strategic Action Agenda: Next Steps		
Goal		Means to an End Goal		Recommendations
1. We can all eat any fish.				
				
				
4. All habitats are healthy, naturally diverse, and sufficient to sustain viable biological communities.				
				
5. Public access to open space, shoreline, and natural areas is abundant and provides enhanced opportunities for human interaction with the Lake Michigan ecosystem.				
6. Land use, recreation, and economic activities are sustainable and support a healthy ecosystem.				

<p>7. Sediments, air, land, and water are not sources or pathways of contamination that affect the integrity of the ecosystem.</p> <p>8. Exotic species are controlled and managed.</p> <p>9. Ecosystem stewardship activities are common and undertaken by public and private organizations in communities around the basin.</p>	  	<p>10. Collaborative ecosystem management is the basis for decision-making in the Lake Michigan basin.</p> <p>11. We have enough information/data/understanding/indicators to inform the decision-making process.</p>	  	<p>Chapter 3 Indicators and Monitoring of the Health of the Lake Michigan Ecosystem</p> <p>Chapter 4 Lake Michigan LaMP: Current Status of the Ecosystem, Beneficial Use Impairments and Human Health</p> <p>Chapter 5 Lake Michigan Stressor Sources and Loads</p>	<p>Means to an End Goal</p> <p>Recommendations</p>	<p>Means to an End Goals</p>